Targeted Substitution of Broadcast Ads Using HbbTV

Industry collaboration to explore

“Targeted Substitution of Broadcast Ads Using HbbTV”

By

DTG Targeted Advertising Task Group

November 2022

Presented by:

Ranjeet Kaur

Associate Director of Products and Services, DTG

DTG Targeted Advertising Task Group

The **DTG End User Experience Group** established a cross-industry task group on Targeted Advertising in **April 2021**, to evaluate the status of HbbTV implementations in currently deployed UK DTT devices for the ***substitution of broadcast ads with broadband-delivered (targeted) ads*** and develop a simple HbbTV application for a demonstration.

An industry project

“Targeted Substitution of Broadcast Ads Using HbbTV”

Project: Targeted Substitution of Broadcast Ads Using HbbTV

Objective

- To understand **reach vs quality trade-offs** related to the substitution of broadcast ads with broadband-delivered (targeted) ads in UK DTT HbbTV receivers.

Goal

Develop a test/demonstration app with two goals in mind:

- Enable stakeholders to see how well each TV can substitute ads using different methods and the range of results that can be achieved with **minimum investment** of their own resources.
- Gather evidence on the **performance variation** of the installed base in the UK market by running the test app in the DTG receiver zoo.

Ideally this evidence would be cross-referenced against market share/sales data to produce data about how much of the installed base could be reached and with what quality.

Project: Targeted Substitution of Broadcast Ads Using HbbTV

Commercial Goal

- Addressable TV propositions, where broadcast ads are replaced by targeted ads can **drive incremental revenue for broadcasters**.
- **Improve targeting and return-on-investment for advertisers**.
- The potential to **improve the relevance of advertising for viewers**.

Device coverage

- Any UK DTT receivers supporting **HbbTV 1.0** (TS 102 796 V1.1.1) or higher versions including non-Freeview Play devices as well.

Key Contributors:

Creation of a Demo Application to Achieve Dynamic Ad Replacement for Free-to-Air TVs Using HbbTV

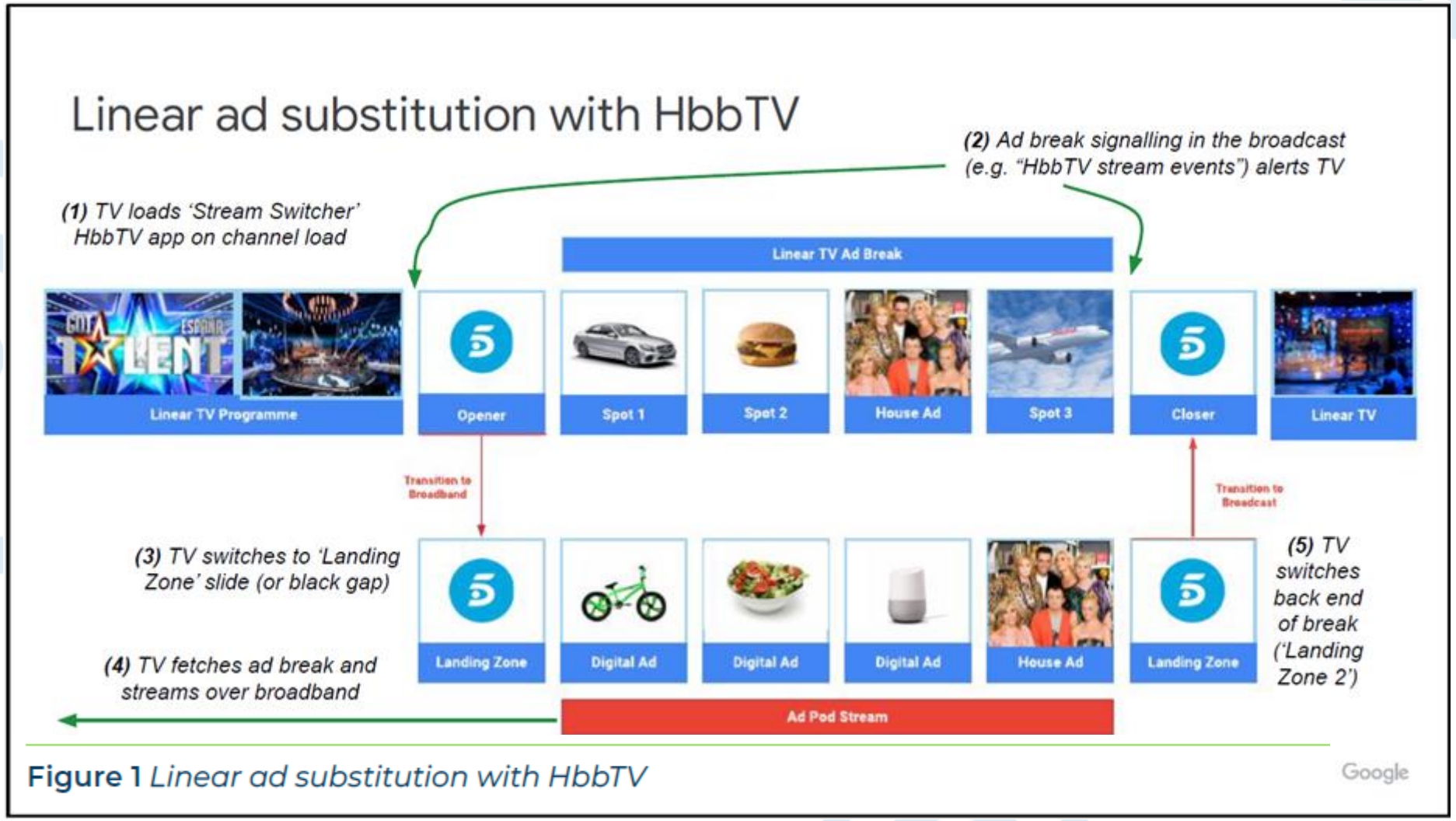


Figure 1 *Linear ad substitution with HbbTV*

Google

DTG HbbTV TA Test App

The working group, together with the DTG, commissioned a third-party developer (MIT-xperts) to develop a **DTG HbbTV TA Test App,** which could run on TVs which supported HbbTV. This comprised:

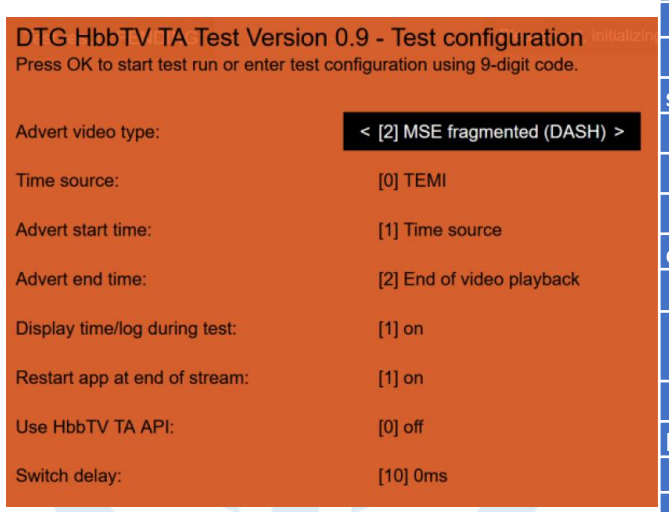
- **"Transport Stream"** of Audio & Video supplied by **Channel 4** ("Countdown") plus two pods of ads (Linear and Digital)
- **HbbTV ad replacement app & webserver** which supported a number of different switching methods, to test the user experience of HbbTV ad replacement
- **QR codes** to allow automated review of tests on a specific TV set, as recorded by a GoPro camera, to allow tuning of the timing thresholds for the landing zones and to drive high confidence in the test results

Test material availability

The DTG HbbTV TA Test App Suite is available to DTG Full Members. However, non-members can contact DTG Customer Services customerservices@dtg.org.uk to get more info on licensing the test suite.

Figure 2 *DTG Targeted Advertising HbbTV test application details*

Test Configuration Options



Setting ID	Option digit	Description
vtype		**Advert video type**
	0	native player mp4 file: Play a progressive download mp4 file using the native video player on the DUT
	1	native player fragmented (DASH): Play a MPEG-DASH file using the native video player on the DUT
	2	MSE fragmented (DASH): Play using the fragments from the DASH, but use Media Source Extensions instead of the native video player
tsource		**Time source (only relevant if starttime or endtime is set to "Time source" or "Automatic")**
	0	TEMI: Use TEMI timeline to determine the time when to switch
	1	PTS: Use Presentation Timestamp of broadcast video to determine the time when to switch
starttime		**Advert start time**
	0	StreamEvent: Use the timing when the StreamEvent is received to start the broadband advert
	1	Time source: Use the configured time source (see above) to determine when the broadband advert should start
	2	Automatic: Try to use the time source, but fallback to StreamEvent timing if the time source is not available on the DUT
endtime		**Advert end time**
	0	StreamEvent: Use the timing when the StreamEvent is received to end the broadband advert and switch back to broadcast
	1	Time source: Use the configured time source (see above) to determine when the broadband advert should end and the switch back to broadcast should occur
	2	End of video playback: When the broadband advert video ends, switch back to broadcast
log		**Display time/log during test**
	0	off: Do not display any overlay
	1	on: Display test status and timing (top-left corner) as well as the test protocol (top-right corner) on top of the video
restart		**Restart app at end of stream**
	0	off: Keep the application running when the broadcast stream wraps around
	1	on: Restart the application when the broadcast stream wraps around
taapi		**Use HbbTV TA API**
	0	off: Use application code to perform the switch between broadcast and broadband
	1	on: Use the HbbTV TA API to perform more efficient switching between broadcast and broadband, see ETSI TS 103 736. Check with the manufacturer of the DUT if this option is supported and under which conditions it is available, as this feature is not a mandatory feature in HbbTV and is often licensed to the broadcaster
delay		**Switch delay** (specify an offset/delay when the actual switch to/from broadcast should occur, relative to the specified switch time in the stream)
	00 – 09	Negative switch delay: Switch before the actual/specified switch time: 00 = -1000ms, 01 = -900ms, … 09 = -100ms
	10	No switch delay: Switch exactly at the actual/specified switch time
	11 – 39	Positive switch delay: Switch after the actual/specified switch time: 11 = +100ms, 12 = +200ms, … 39 = +2900ms

Test configurations selected by the group

Five Test profiles

- **Test 1**: **mp4** with start based on **StreamEvent**, end after replacement ads video **playback has completed**
- **Test 2**: **DASH** with start based on **StreamEvent**, end after replacement ads video **playback has completed**
- **Test 3**: **MSE** with start based on **StreamEvent**, end after replacement ads video **playback has completed**
- **Test 4**: **mp4** with start and end based on **TEMI**
- **Test 5**: **mp4** with start based on **PTS**, end after replacement ads video **playback has completed**

Project Plan

Perform the DTG Zoo test

Perform video analysis to identify the following :

- **Accuracy** of the switch from **broadcast to broadband**
- **Speed** of the switch from **broadcast to broadband**

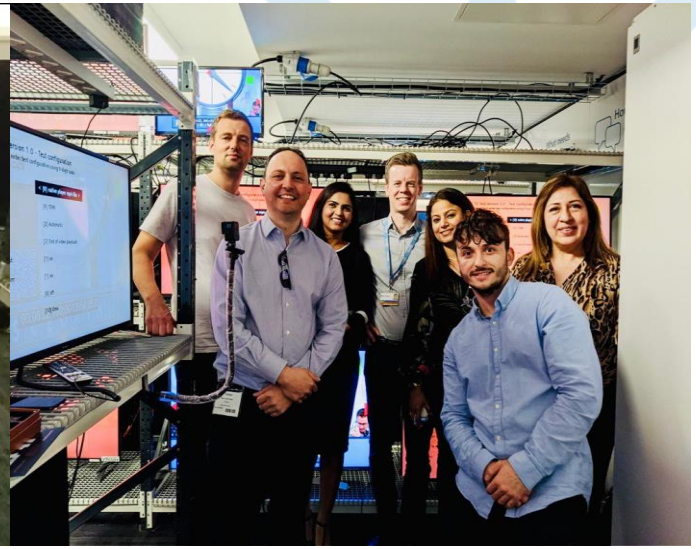
- **Accuracy** of the switch from **broadband** back to **broadcast**
- **Speed** of the switch from **broadband** back to **broadcast**

- **Risk** of advert playback stalling due to **network delays**
- Whether the **first** and **last frames** of an advert are **visible**

Cross-reference the data with the penetration of each TV set in the market to get the “reach” number

Investigate trade-offs between switching **time/accuracy** and **reach**

DTG Zoo Test



This is an example of a test being run - **Camera setup** to capture video with the timings (encoded in the QR code) for programmatically checking the following:

- If ad insertion happened at all
- When it happened
- How complete the ad break was and whether it was shown at an acceptable quality
- If, and when, the app switched back.

Tests have been conducted on **100+** HbbTV devices in the DTG Zoo so far, on devices from **2014 to 2022**. Test engineer support provided by **DTG Testing**, **TP Vision** and **Google**.

DTG Zoo Test Results Analysis

Ad-switch capability test results analysis

Most IP-connected TVs which support HbbTV (99% for best performing test) have the capability to switch between broadcast to broadband to customise ad experiences.

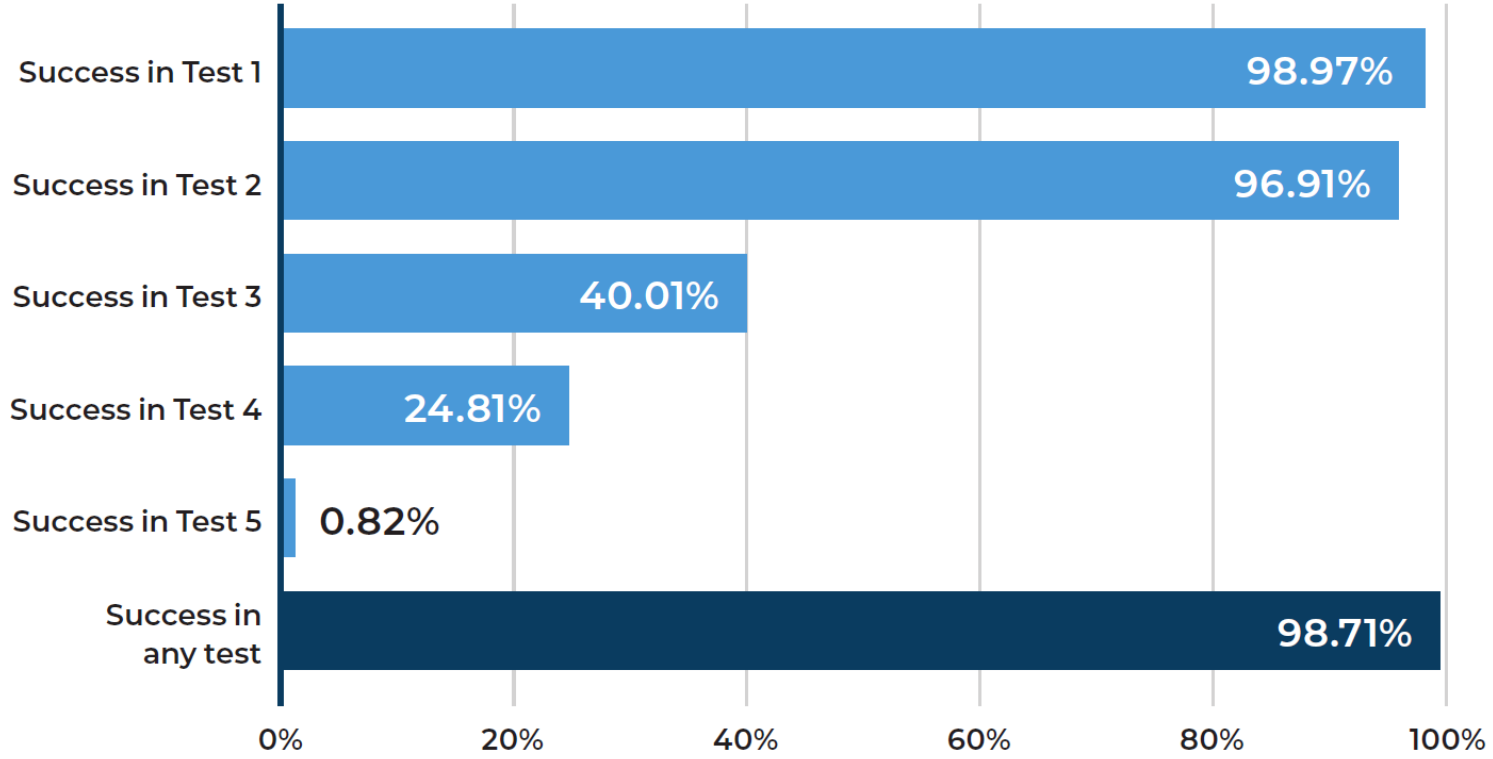


Figure 3: *Ad-switch capability weighted for market reach*

DTG Zoo Test Results Analysis

Reach vs quality trade-off analysis

"Acceptable viewer experience" defined as dropping 10 or fewer frames at either side of the switch between broadcast and broadband.

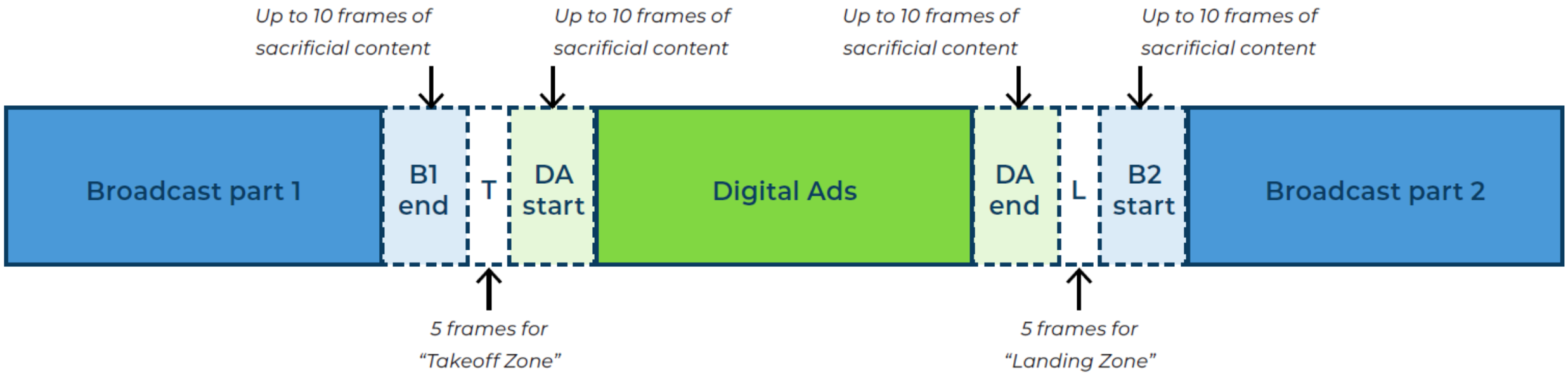


Figure 4: *Expected flow and accepted frame loss at either end of an ad transition*

DTG Zoo Test Results Analysis

Reach vs quality trade-off analysis

Almost two-thirds of IP-connected TVs which support HbbTV (63% for best performing test) can do the switch at an “acceptable viewer experience”.

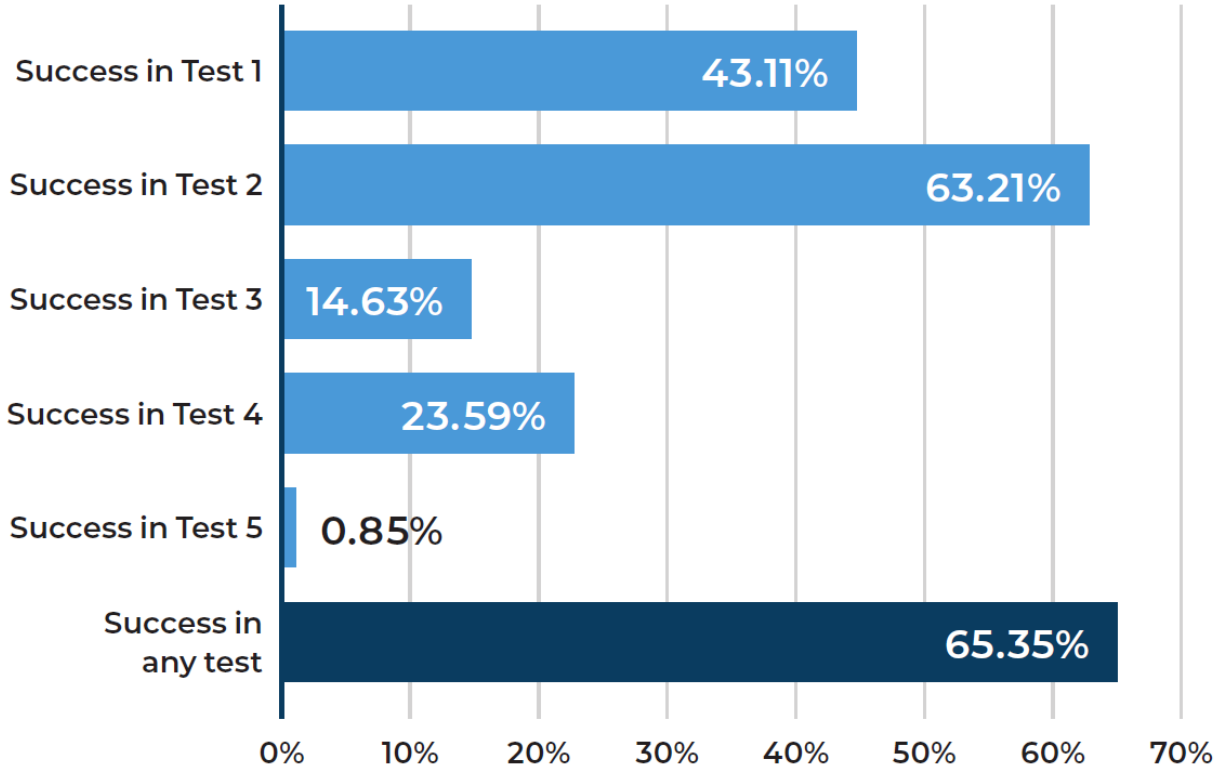


Figure 5: *Reach vs quality trade-off weighted for market*

DTG Zoo Test Results Analysis

Combining the results

Comparing the ad-switch capability pass rate to the within threshold pass rate shows us how many of the capable devices were able to do the switch within the thresholds.

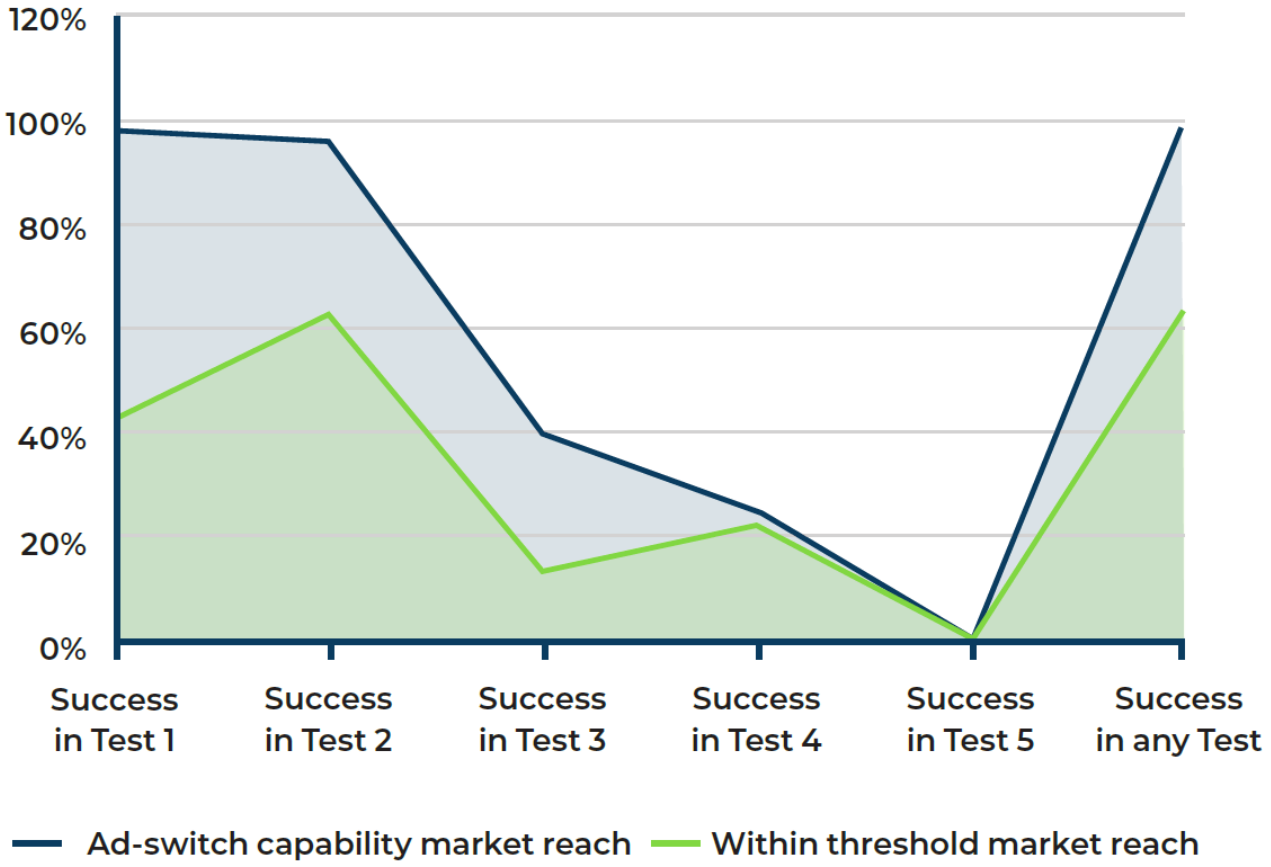


Figure 6: *Market reach ad-switch capability vs within*

DTG Zoo Test Results Analysis

Implications of market reach analysis

Based on current estimates, we believe that around half of all active Freeview devices in UK homes are addressable.

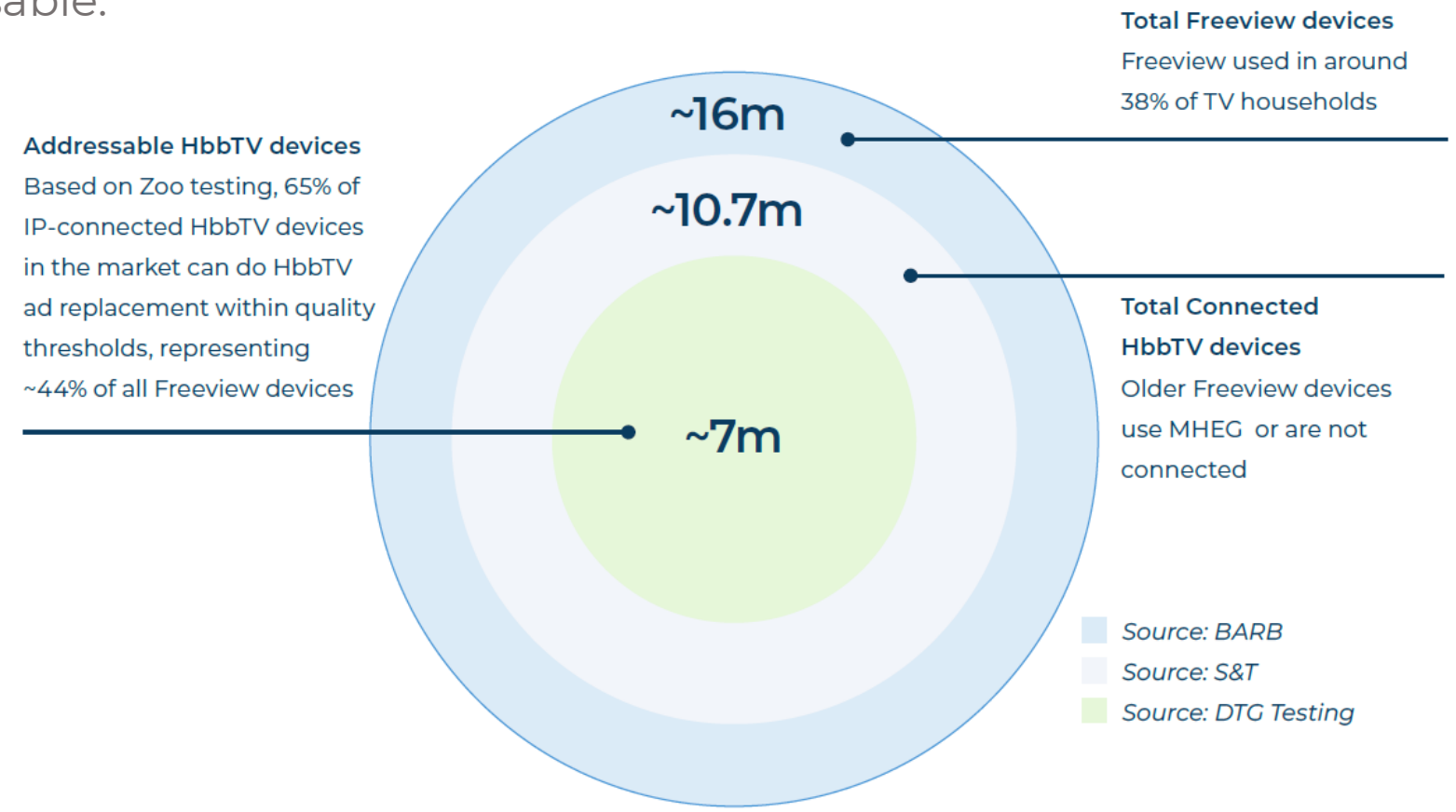


Figure 7: *Market reach for Addressable TV using HbbTV on DTT*

Conclusion

The group has concluded that the potential reach of HbbTV ad replacement which can support a good viewer experience in the UK is sufficiently high for a UK broadcaster to:

- **Conduct a live trial of such technology**,
- **Commercialise** as an advanced TV advertising proposition.

Contact us

DTG | www.dtg.org.uk | www.dtgtesting.com

5th Floor, 89 Albert Embankment | London | SE1 7TP

Email: rkaur@dtg.org.uk | Mob: +44 (0)7889 630 406

THE CENTRE OF UK DIGITAL TV

@theDTG

LinkedIn /the-dtg